U.S. EPA Superfund Program Proposed Remedial Action Plan

UGI Columbia Gas Plant

Columbia Lancaster County, Pennsylvania **JUNE 27, 2007**

Public Comment Period ends July 26, 2007

I. INTRODUCTION

The United States Environmental Protection Agency (EPA) is issuing this Proposed Remedial Action Plan (Proposed Plan) to describe remedial alternatives for the UGI Columbia Gas Plant Superfund Site (Site) located in Columbia Borough, Lancaster County, Pennsylvania. This Proposed Plan identifies groundwater monitoring and institutional controls as the United States Environmental Protection Agency's (EPA's) preferred remedial alternative for the Site. A detailed description of EPA's Preferred Remedial Alternative may be found on page 30 of this Proposed Plan. In addition, this Proposed Plan includes a summary of background information relating to the Site; describes the rationale for the selection of EPA's preferred alternative; solicits public review and comment on all of the alternatives described in this Proposed Plan, and provides information on how the public can be involved in the remedy selection process.

Dates to Remember:

June 27 to July 26, 2007
30 Day Public Comment Period on Alternatives in Proposed Plan.

July 19, 2007 at 7PM
Public meeting at the Columbia Borough Hall
308 Locust Street
Columbia, PA

EPA is the lead agency for Site activities under the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F. R. Part 300, pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. §§ 9601 to 9675. EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 300.430(f)(2) of the NCP. This Proposed Plan fulfills the public notification requirements of CERCLA §§ 113(k)(2)(B), 117(a), and 121(f)(1)(G), 42 U.S.C. §§ 9613(k)(2)(B), 9617(a), and 9621(f)(1)(G).

INSIDE

This Proposed Plan highlights key information from the Remedial Investigation/Feasibility Study Report (RI/FS) for the Site, as well as other documents upon which this Proposed Plan is based. These documents are available for public inspection in an Administrative Record file for the Site. The Administrative Record may be reviewed electronically at http://www.epa.gov/arweb and at the following locations:

Columbia Public Library
24 South Sixth Street
Columbia PA 17512-1599
(717) 684-2255

U.S. EPA Region III 6th Floor Docket Room
Ms. Anna Butch (3HS42)
1650 Arch Street
Philadelphia, PA 19103
(215) 814-3157

With this document, EPA is soliciting public comments on its preferred remedial alternative. EPA encourages the public to review and comment on each of the clean up options evaluated in this Proposed Plan and other documents in the Administrative Record file during the public comment period which begins on June 27, 2007 and closes on July 26, 2007. On July 19, 2007, at 7PM to 9PM, EPA will hold a public meeting to discuss this Proposed Plan at the Columbia Borough Hall, 308 Locust Street, Columbia, PA. Written comments, postmarked no later than July 26, 2007 should be mailed to:

David Turner (3HS22)
Remedial Project Manager
U.S. Environmental Protection Agency Region III
1650 Arch Street
Philadelphia, PA 19103

Although EPA has identified its preferred remedial alternative, EPA has not selected a final remedy for the Site. EPA will select the final remedial alternative for the Site in consultation with the Pennsylvania Department of Environmental Protection (PADEP), the support agency for this response action, only after careful consideration of the information submitted by the public during the public comment period. EPA may modify its preferred remedial alternative, select another response action or develop other alternatives if public comment warrants or if new material is presented. EPA in consultation with PADEP will make its final remedy selection for the Site in a Record of Decision (ROD).

A comprehensive listing of EPA's Superfund terminology explaining terms that may be unfamiliar to the general public is located at the end of this Proposed Plan.

II. SITE BACKGROUND

A. Site Description

The Site is located in Columbia Borough, Lancaster County, Pennsylvania, approximately four hundred feet northeast of the Susquehanna River, illustrated on Figure 1. The Site includes a former manufactured gas plant (MGP) which occupies approximately 2 acres; the Borough of Columbia's (Borough) municipal garage; the Lancaster Water Authority (LWA) pumping station; property owned by Pennsylvania Lines LLC; and a pedestrian tunnel which extends underneath the railroad tracks on the northern side of the Site. The Shawnee Creek, a tributary to the Susquehanna River, and the Municipal Authority of Columbia's wastewater treatment plant are also located in the vicinity of the Site.

The area surrounding the Site is predominantly a light industrial area; however, the Site is bordered on the southeast by residential property. The Site is located in an area recently zoned as a "conservation district". The Borough implemented this zoning classification to minimize development near the Susquehanna River. Under this zoning classification, residential and groundwater well development are not allowed. In addition, the Borough requires all water supply outlets within the Borough to be connected to either a public water system or a PADEP-approved private water system. The LWA, which supplies drinking water to the Borough, draws water from the Susquehanna River about 2,500 feet upstream of the Site.

B. MGP Facility Ownership

From 1851 to 1935, the Columbia Gas Company (Columbia Gas) used the Site for manufacturing gas for distribution in the City of Columbia. In 1935, Columbia Gas became a subsidiary of Pennsylvania Power and Light Company (PP&L Co.) and ownership of the MGP Facility was transferred to PP&L Co. PP&L Co. continued to manufacture gas at the MGP Facility until 1949. In 1949, sometime after it ceased gas manufacturing operations at the MGP Facility, PP&L Co. sold the MGP Facility to the Lancaster County Gas Company (Lancaster Gas). From 1949 and 1950, Lancaster Gas used the MGP Facility to produce a propane/air mixture which was used as a substitute for gas manufactured from coal. Lancaster Gas decommissioned the propane/air plant at an undocumented time in 1950. At that time, aboveground structures were demolished and removed, and the gas relief holder foundations and tar/waste separator were backfilled.

In 1953, Lancaster Gas merged with the United Gas Improvement Company (UGI Company) at which time UGI Company acquired ownership of the MGP Facility. In 1976, Thomas and Rosemary Crouse (the Crouses) purchased the MGP Facility from UGI Corporation, formerly known as UGI Company. It is unclear for what purposes the Crouses used the MGP Facility. Since the time UGI Corporation sold the MGP Facility to Crouses, UGI Corporation changed its name to UGI Utilities, Incorporated (UGI). What is now known as UGI Corporation is a holding company.

In 1979, the Crouses sold the MGP Facility to George and Gladys Roach (the Roaches).

The Roaches used the MGP Facility for the retail sale of boats. After Mr. Roach purchased the MGP Facility, he found tar oozing into the parking area. Subsequently, regrading took place at which time tar displaced from the relief holder pit was pushed into the pedestrian tunnel and a small earthen dike was built to contain the tar. In 1991, the Roaches sold the MGP Facility to their daughter, Darlene Judd.

In January 1994, PP&L Co. repurchased the MGP Facility from Darlene Judd. In 1997, PP&L Co. changed its name to Pennsylvania Power and Light, Incorporated (PP&L Inc.) and in 2000, PP&L Inc. changed its name to PPL Electrical Utilities Corporation (PPL). PPL is the current owner of the MGP Facility. The MGP Facility is currently not in use and is surrounded by a security fence.

C. MGP Facility Operation

Gas was historically produced at the Site through a coal gasification process which included reacting steam with hot coal, coke and wood. The gas went from two gas generating sets through a washbox, condenser, washer cooler, and then was stored in a gas holder. From the gas holder, the gas went through a coal tar separator and a purifier and finally to a relief holder for distribution in the City of Columbia.

The primary waste streams generated during the coal gasification process were liquid coal tar, boiler ash and spent gas purifying materials. Coal tar is a mixture of volatile organic compounds (VOCs) including benzene, toluene, and xylene (BTEX); semi-volatile organic compounds (SVOCs) including polycyclic aromatic hydrocarbons (PAHs) and inorganics including metals and cyanide (hereinafter collectively referred to as "MGP-related wastes"). Coal tars were generated from the coal tar separator which separated coal tar from liquid waste. The coal tar separator received liquids from the washer cooler, drip pumps and overflows from the gas holder. Coal tars generated from the tar separator were stored in the relief holder pit, which had a 46,000 cubic foot capacity, to allow for separation of the tar/water emulsion. The relief holder pit was constructed of riveted steel plates and was held within a pit that was approximately 30 feet deep. The relief holder pit failed in 1947, and its foundation was used, thereafter, for tar separation. Marketable coal tar was removed for sale and below-grade tar was left in the pit. Overflows of the tar separator, which occurred during periods of heavy rainfall and in the winter, were discharged to an open ditch that led to the Susquehanna River. There are reports that local fishermen complained to the MGP Facility that their boats were being covered with tar.

Boiler ash was stockpiled in the area in front of the relief holder during the 1930s and 1940s. The ash was hauled away three times per week. A portion of the boiler ash may have been disposed on the southern side of Front Street. It is not known where the majority of the ash was disposed. The boiler ash does not contain any contaminants of concern at the Site.

The purifier wastes were generated from iron-oxide treated wood chips arranged on wooden racks. When the wood chips could no longer be regenerated, they were removed from the purifier. The wood chips were subsequently disposed of on Site as paving and dust control

material. The wood chips contained cyanide which is a contaminant of concern at the Site.

D. Environmental Studies and Previous Actions

Results of early environmental investigations revealed that MGP operations at the Site resulted in the release of VOCs, PAHs, heavy metals, and cyanide into soil, groundwater and surface water at the Site. EPA proposed the Site for inclusion on the Superfund National Priorities List (NPL) in June 1993 and added the Site to the NPL in May 1994.

In April 1996, PP&L entered into a Consent Order and Agreement with PADEP to conduct a RI/FS to determine the nature and extent of contamination at the Site, to characterize the risks to human health and the environment, to evaluate alternatives to clean up the contamination at the Site, and to initiate interim actions on the gas and relief holders and the Susquehanna River.

In 1997, PP&L applied steam and hot water injection to the two gas and relief holders. In addition, approximately 3,350 gallons of tar were extracted from the two holders and taken for off-site thermal treatment and disposal. Following the tar extraction, coal tar remained in subsurface soils below the holders. The holders were then injected with over 760 cubic yards of a grout and cement mixture to stabilize and solidify them. In addition, in 1998, approximately 700 tons of contaminated sediments were removed from the Susquehanna River and shipped off-site for thermal treatment and disposal. A sheet pile wall was installed along the river bank in the area adjacent to the sediments. The area was re-graded and covered with a geosynthetic cloth, rock, and stone.

In April 1998, PADEP approved the RI and in June 1998, it approved a Risk Assessment Report. The RI identified approximately 15,000 cubic yards of contaminated surface and subsurface soil on-Site. The RI also identified contamination in on-Site groundwater that had migrated off-Site and was detected in deep groundwater near the Susquehanna River. In 2002, PADEP approved PPL's FS Report which determined options for addressing the remaining contamination at the Site.

In October 2006, EPA approved a Groundwater Engineering Analysis Report (Groundwater Report) for the Site. In the Groundwater Report, PPL provided documentation for a request for a technical impracticability (TI) waiver (TI Waiver) for the applicable or relevant and appropriate requirements (ARARs) for groundwater due to the presence of Dense Non-Aqueous Phase Liquid (DNAPL) in the fractured bedrock under the MGP Facility. The MGP-related wastes form the DNAPL under the MGP Facility.

In November 2006, EPA received a Soil Remedy Engineering Analysis Report (Soil Report) for the Site from PPL and UGI. The Soil Report updated the cost estimates presented in the FS.

On November 29, 2006, PPL, UGI and EPA entered into an Administrative Settlement and Order on Consent (2006 Settlement Agreement), Docket No. CERC-03-2007-0006DC,

pursuant to Sections 104, 106(a) and 122(a) of CERLCA, 42 U.S.C. §§ 9604, 9606(a) and 9622(a). Under the Settlement Agreement, PPL and UGI agreed to, among other things, install caps over two (2) areas where MGP-related wastes remained on-Site and excavate and dispose of soil and MGP-related wastes as necessary.

III. SITE CHARACTERIZATION

The various environmental investigations conducted at the Site and surrounding areas identified MGP-related wastes in groundwater, soil and sediments in a nearby area of the Susquehanna River.

A. Groundwater

Based upon the information gather during the RI, PPL estimates that between 345 and 34,500 gallons of DNAPL are contained within the fractured bedrock under the MGP Facility and under surrounding land parcels at the Site. The range in this estimate is primarily a function of the estimated potential variance in the fractured bedrock pore space in the DNAPL source area. The DNAPL is composed of tar-like liquids resulting from the former MGP operations which do not easily dissolve in water (i.e., low solubility). The DNAPL was found primarily in two distinct fracture zones which are oriented in an east-west direction and extend an estimated 880 feet away from the location of the former holding tanks, the likely source area.

A dissolved phase plume has been identified in the immediate vicinity of the DNAPL. Since the DNAPL has a low solubility and does not mix well with groundwater, the plume area is relatively small and is found in the area immediately adjacent to the DNAPL. The DNAPL and the portion of the dissolved phase plume which is immediately adjacent to the DNAPL is hereinafter referred to as the "DNAPL Zone." All of the DNAPL is believed to be located in the DNAPL Zone illustrated on Figure 2. The DNAPL Zone has a spatial extent of approximately seven (7) acres and a depth of 160 feet below ground surface as illustrated on Figure 3.

The dissolved phase plume immediately adjacent to the DNAPL is prevented from expanding by the presence of the Susquehanna River into which the groundwater discharges. Sampling and analysis show that any contaminated groundwater discharged into the Susquehanna River is quickly diluted to levels below those that are detectable.

A portion of the dissolved phase plume is being drawn towards the cooling water wells operated by the LWA which is located to the west of the DNAPL Zone. The LWA uses two extraction wells (cooling water wells) to generate cooling water for its river water intake pumps. As a result of long-term pumping, a lobe of dissolved phase plume (LWA Lobe) has been drawn over to and is captured by the LWA's pumping wells CWW-1 and CWW-2. The raw water pump station on Front Street pumps water from the Susquehanna River to the treatment plant on 15th Street. The pump station has six vertical turbine pumps. The bearings on these pumps require water for both cooling and cleaning. River water was originally used for cooling the main intake pumps at the plant. However, the LWA had problems with debris and turbidity and

in 1954 stopped using river water and installed a cooling water well (CWW-1). As the plant capacity expanded, an additional cooling water well (CWW-2) was installed. Both wells are six inches in diameter and 150 feet deep. Reportedly, the wells are each capable of pumping approximately 50 gallons per minute (g.p.m.). To meet current needs the combined pumping rate from both wells for cooling water is approximately 11 g.p.m. The wells alternate on and off as the system calls for water.

The cooling water discharges to a wet well beneath the pump station on Front Street. The main surface water intake pumps also discharge to the wet well. The cooling water wells contribute one tenth of one percent of the total water supply. The LWA treats the source water from both the Susquehanna River and the cooling water wells to make it potable. The maximum capacity of the plant is 25 million gallons per day (mgd); however, the average amount treated is approximately 12 mgd. After treatment, this water is tested to confirm it is potable in accordance with PADEP requirements and is then distributed through the public water supply system.

As part of the RI study, samples of cooling water were taken as part of groundwater monitoring activities. Benzene exceeded its Maximum Contaminant Levels (MCL) promulgated at 40 C.F.R. Part 141 pursuant to Section 1412 of the Safe Drinking Water Act, 42 U.S.C. Section 300g-1, in samples collected from CWW-1 during both rounds of sampling (49 micrograms per liter (ug/l) in round No. 1 and 140 ug/l in round No. 2). The VOCs, toluene and xylene, were also detected in the second round of sampling from CWW-1 (3 ug/L) and CWW-2 (2 ug/L), respectively. Benzene was detected above its MCL in samples from CWW-2 during both rounds (46 ug/l and 240 ug/l).

The LWA Lobe extends outside the spatial extent of the DNAPL Zone. If LWA were to stop pumping wells CWW-1 and CWW-2, a portion of the LWA Lobe would likely remain outside the DNAPL Zone and it would no longer be extracted and treated. In that event, alternate remedial methods would have to be examined to determine if remediation of the LWA Lobe were necessary.

Groundwater sampling results from the RI, illustrated in Table 1, below, revealed that the following chemicals of potential concern (COPCs) have exceeded their respective MCL and/or their respective EPA Region III Risk-Based Concentration (RBC):

Table 1: Site Contaminants of Potential Concern Detected in Groundwater

Compound	**Maximum Concentration Detected (mg/l)**	**RBC For Tap Water (mg/l)***	**MCL (mg/l)***
Volatile Organic Compounds (VOCs)			
Benzene	39	0.00034 (C)	0.005
Ethylbenzene	4.7	1.3 (N)	0.7

Compound	Maximum Concentration Detected (mg/l)	RBC For Tap Water (mg/l)*	MCL (mg/l)*
Tetrachloroethene	0.005	0.0001 (C)	0.005
Toluene	9.5	2.3 (N)	1.0
Trichloroethene	0.003	0.000026 (C)	0.005
1,2,4-Trimethylbenzene	0.47	0.061 (N)	0.07
Xylenes (Total)	3.7	0.21 (N)	10
Semi-Volatile Organic Compounds (SVOCs)			
Acenaphthene	0.75	0.37 (N)	NA
Benzo(a)anthracene	0.19	0.00003 (C)	NA
Benzo(a)pyrene	0.15	0.000003 (C)	0.0002
Benzo(b)fluoranthene	0.13	0.00003 (C)	NA
Chrysene	0.14	0.003 (C)	NA
Fluoranthene	0.28	1.5 (N)	NA
1-MethylNaphthalene (1)	0.75	0.0065 (N)	NA
2-Methyl Naphthalene	2.6	0.024 (N)	NA
Naphthalene	8.2	0.0065 (N)	NA
Phenanthrene (2)	1.2	0.18 (N)	NA
Pyrene	0.72	0.18 (N)	NA
Other SVOCs			
Bis(2-ethylhexyl phthalate - also called- di(2-ethylhexyl)phthalate or DEHP	0.069	0.0048 (C)	0.006
Dibenzofuran	0.081	0.037 (N)	NA
Inorganic Compounds			
Aluminum	9.6	37 (N)	0.05-0.2 (4)
Barium	0.541	7.3 (N)	2
Cyanide	0.22	0.73 (N)	0.2
Iron	42	26 (N)	0.3 (4)

Compound	Maximum Concentration Detected (mg/l)	RBC For Tap Water (mg/l)*	MCL (mg/l)*
Lead	0.019		0.015 (TT)
Manganese	3.0	0.73 (N)	0.05 (4)

* = Since the RI, EPA has updated the MCLs and/or RBCs for some of the Site-related COPCs. This Table reflects the current MCLs, as of June 2003, and RBCs, as of April 2007.

NA- Not Available
1- The RBC for Naphthalene is used as the RBC for these compounds
2- The RBC for Pyrene is used as the RBC for this compound
3- EPA "Action level" for lead in groundwater
4- Secondary MCL

N- Indicates that the RBC is based on noncarcinogenic effects (using a target hazard quotient of 0.1).
C- Indicates that the RBC is based on noncarcinogenic effects (using a target cancer risk of 10E-06).
TT- Treatment technique

B. Soils

The RI identified approximately 15,000 cubic yards of remaining contaminated surface and subsurface soils at the Site. The RI identified the following soil contamination:

1. **Surface Soil (0 to 6 inches deep)**:

The RI included the collection of three on-site samples and five off- site surface soil samples. One off-site sample was collected northwest of the Site, and the other four were collected south/southwest of the Site between the Site and the Susquehanna River. Full analytic results are presented in the RI.

Surface Soils COPCs:
PAHs: Acenaphthylene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Benzo(a)pyrene, Dibenzo(a,h)anthracene and Indeno(1,2,3-cd)pyrene

Inorganics: Aluminum, Arsenic, Beryllium, Cadmium, Iron, Lead and Manganese

2. **Subsurface Soil (deeper than 6 inches)**:

The RI included the collection of eight on-site samples and eight off-site samples ranging in depth from 1.3 feet to 23.1 feet. Five of the off-site samples were from soil borings and 3 were from test pits. Four off-site samples were located near the bank of the Susquehanna River and four near Front Street and the railroad tracks south of the Site property. All sixteen (16) samples were analyzed

for PAHs, target analyte list (TAL) metals and cyanide.

Subsurface Soils COPCs:
PAHs: Acenaphthylene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Benzo(a)pyrene, Dibenzo(a,h)anthracene, Indeno(1, 2, 3-cd)pyrene

Inorganics: Aluminum, Arsenic, Beryllium, Iron, Manganese and Thallium.

C. Sediments

1. Shawnee Creek

Sampling conducted in 1998 as part of the RI found COPCs in the sediments of Shawnee Creek. However, based on sampling conducted by PPL in February 2005, EPA has determined that the data demonstrate that MGP-related wastes are not the main source of the relatively low concentrations in sediments at, near, and upstream of the Site.

2. Susquehanna River

In July 2003, PPL took samples of Susquehanna River sediments as part of its TI Waiver application to evaluate whether MGP-related wastes in bedrock groundwater could discharge to river sediments. While sampling results revealed that total PAHs range from 0.111 mg/kg to 18.59 mg/kg, the kinds of PAHs found in the Susquehanna River sediment were not those which are formed during the MGP process. Therefore, EPA has determined that MGP-related wastes are not impacting Susquehanna River sediment.

D. Sediment Pore Water

In July 2003, PPL also conducted sediment pore water sampling at, near, and upstream of the former MGP Facility as part of its TI Waiver application. The sampling results show that concentrations of VOCs and PAHs were non-detectable in sediment pore water. This data demonstrates that the risk posed to ecological receptors, such as sediment fauna, does not warrant a response action.

E. Surface Water

No Site-related MGP COPCs have been detected in the surface water.

IV. SCOPE AND ROLE OF REMEDIAL RESPONSE ACTIONS

This Proposed Plan presents EPA's preferred remedial alternative for addressing groundwater and soil contamination at the Site. PAHs, VOCs and inorganics are present in the groundwater at concentrations which exceed drinking water standards (i.e., MCLs). EPA's

primary remedial action objectives are to restore the aquifer to its beneficial use as a drinking water source and to implement institutional controls (ICs) to prevent residential use and any other uses of the Site property which would interfere with or adversely affect the integrity or protectiveness of the remedial actions performed at the Site. EPA intends its preferred remedy, as identified in this Proposed Plan, to be the final response action for the Site.

V. SUMMARY OF SITE RISKS

As part of the RI, PPL performed a Preliminary Ecological Risk Assessment in 1994 and a Baseline Human Health Risk Assessment (HHRA) Report in 1998. The HHRA Report evaluated hypothetical upper-bound carcinogenic (cancer causing) and non-carcinogenic risks to various potential human receptors of COPCs from the Site known as the Reasonable Maximum Exposure (RME). The HHRA Report relied upon conservative assumptions and used conservative input parameter values. As such, the numeric values summarized in the HHRA Report should be considered conservative estimates of risks to human health.

The NCP, 40 C.F.R. Part 300, establishes acceptable levels of carcinogenic risk for Superfund sites ranging from one excess cancer case per 10,000 people exposed to one excess cancer case per 1 million people exposed if no action is taken at the site. The risk range is, therefore, between one in 10,000 and one in one million additional cancer cases. Expressed in scientific notation, the risk range is between 1.0E-04 and 1.0E-06 over a defined period of exposure to contaminants at the Site. Remedial Action is warranted at a Site when the calculated cancer risk level exceeds 1.0E-04. EPA's initial cleanup goal is to reduce risk to 1.0E-06. When multiple contaminants make the reducing the aggregate risk to 1.0E-06 impracticable, EPA will establish cleanup goals which reduce the risk presented by the Site to within the acceptable risk range (between 1.0E-04 and 1.0E-06).

The NCP also states that sites should not pose a health threat due to non-carcinogenic but otherwise hazardous chemicals. Chemical contaminants that are ingested (eaten), inhaled (breathed) or dermally absorbed (skin contact) may present non-carcinogenic risks to different organs of the human body. EPA defines a non-carcinogenic threat by a ratio, called the Hazard Index (HI). The HI identifies the potential for the most sensitive individuals to be adversely affected by the non-carcinogenic effects of chemicals. Although the HI is not a linear scale, as a general rule, the greater the value of the HI above 1.0, the greater the level of concern. Thus, if the HI exceeds 1.0, there may be concern for the potential non-carcinogenic health effects associated with exposure to the chemical.

A. HHRA

PPL concluded in the HHRA that groundwater and soil at the Site posed unacceptable risks due to the presence of MGP-related wastes. Surface water, sediments, and air were eliminated from further evaluation based on the results of the human health risk assessment and, thus, were not considered for remedial actions.

1. Groundwater

Contaminated groundwater has been detected in monitoring wells on Site. Currently there are no drinking water wells located at the Site or in the area between the Site and the Susquehanna River. If a drinking water well were installed in these areas, the use of groundwater as drinking water could pose non-carcinogenic risks (HI) greater than 1 and potential cancer risks greater than 1E-04.

Groundwater samples collected from residential wells located approximately one quarter mile to the northwest of the Site were analyzed for MGP-related wastes. There were no MGP-related wastes detected. Transport of COPCs toward these residences appears unlikely based on the location of the wells, the low mobility of the MGP-related wastes, and the nature and direction of the bedrock fractures. Moreover, these private wells have been abandoned and the residences are now on public water. The following table, Table 2, shows the groundwater risk estimates for the scenarios considered in the HHRA:

Table 2: Groundwater Human Health Cancer Risks For Current and Future Scenarios

Scenario: Future Receptor	Total Risk	
	Hazard Index (HI)	Cancer Risk
Hypothetical Resident (Off MGP Facility in DNAPL Zone Between Site and River)		
Child (0-6 yrs)	920	7E-03
Adult (7-30 yrs)	370	1E-02
Hypothetical Resident (On MGP Facility)		
Child (0-6 yrs)	580	1E-02
Adult (7-30 yrs)	230	2E-02

2. Soils

The following table, Table 3, shows the soil risk estimates for the scenarios considered in the HHRA and a May 19, 1998 EPA Human Health Risk Memorandum. For the table, it can be seen that on-site soils (surface and subsurface) would pose an unacceptable risk to potential future residents. The Hazard Quotients for the on-site construction worker scenario and off-site child resident scenario were found to be 1.2 and 1.8, respectively.

Table 3: Soils Human Health Cancer Risks For Current and Future Scenarios

Receptor	Total Risk	
	Hazard Index (HI)	Cancer Risk
Scenario: Onsite		
Industrial Worker (Surface Soil Only)	0.12	1.3E-05

*Construction Worker (Surface and Subsurface Soil)	1.2*	2.3E-05
Trespasser (Surface Soil and Sediment)	0.05	1.3E-06
Child Resident (Surface and Subsurface Soil)	4.2	4E-04
Adult resident (Surface and Subsurface Soil)	0.4	1.6E-04
Scenario: Offsite (Subsurface Soil Near River)		
Construction Worker	0.4	3.3E-06
Child Resident	1.8	6.2E-05
Adult Resident	0.12	2.4E-05
Scenario: Offsite (Subsurface Soil South of the Site)		
Construction Worker	0.6	1.1E-05

* NOTE: This result taken from HHRA Report. All other results in table taken from EPA Human Health Risk Memorandum dated May 19, 1998.

a. MGP Facility Soils

Pursuant to the 2006 Settlement Agreement, PPL and UGI are required to, among other things, install two (2) caps in areas where MGP-related wastes remained in the soil. EPA anticipates that upon completion of the work now being conducted, the risk associated with exposure to Site soils will be eliminated so long as the Site is not used for residential purposes and the integrity and protectiveness of the caps are maintained.

If the Site is ever developed for residential use, Site soils (surface and subsurface) would pose an unacceptable risk for potential future residents. For the future resident scenario, the cancer risk estimate for a child resident is 4E-04, and the cancer risk estimate for an adult resident is 1.6E-04. The HI values for future potential child and adult residents are 4.2 and 0.4, respectively.

b. Soils near the Susquehanna River and the wastewater treatment plant

If this area of the Site is redeveloped for industrial purposes, the soil would pose a relatively low cancer risk to construction workers by direct contact with subsurface soils. The estimated risk is 3.3E-06, and is associated with incidental ingestion of carcinogenic PAHs in subsurface soil while excavating at the Site. The non-carcinogenic risk is 0.4. Since the calculated risks are within EPA's acceptable risk range, remedial action in this area is not

warranted.

c. Soils between Front Street and the railroad tracks across from the MGP-Facility

If this area of the Site is redeveloped for industrial purposes, the potential for soil to pose a moderate cancer risk to construction workers is estimated to be 1.1E-05 and is associated with incidental ingestion of carcinogenic PAHs in subsurface soil while excavating at the Site. The non-carcinogenic risk is 0.6. Since the calculated risks are within EPA's acceptable risk range, remedial action in this area is not warranted.

3. Susquehanna River Sediment

MGP-related wastes were present in the sediment of the Susquehanna River. Removal of the impacted sediments occurred in January 1998. The removal of sediments eliminated the human health risk associated with exposure to MGP-related wastes in those sediments.

4. Surface Water in Susquehanna River

There were no COPCs detected in Susquehanna River surface water.

5. Shawnee Creek Sediment

Under current conditions, the potential risk associated with exposure from incidental ingestion and dermal contact to Shawnee Creek sediment is less than 1E-06. Therefore, remedial action in this area is not warranted.

6. Surface Water in Shawnee Creek

There were no COPCs detected in Shawnee Creek surface water.

B. Ecological Risk Assessment

A preliminary ecological risk assessment (PERA) was conducted for the Site in 1994 and submitted to the PADEP and EPA for review and subsequent approval. The PERA provided a basis for determining if a potential for ecological risk exists and identified data gaps that should be addressed in order to quantify risks. The PERA indicated that no habitat existed on the Site, but PAHs in the Susquehanna River sediment posed a potential risk to the environment. The contaminated sediment was removed in January 1998 in a removal action described in PPL's Engineering Evaluation/ Cost Analysis (EE/CA).

In July 2003, the Susquehanna River sediments were again sampled, and in February 2005 Shawnee Creek sediments were also re-sampled. Site-related contaminant concentrations found in surface water and sediments in the river were below the respective ecological screening

levels. Furthermore, the data from the Susquehanna River and Shawnee Creek indicated that PAH contamination was due to non-Site related sources. Therefore, EPA concluded that a baseline ecological Risk Assessment was unnecessary for the Site.

VI. REMEDIAL ACTION OBJECTIVES

The Remedial Action Objectives (RAOs) for the risk associated with the soil and groundwater at the Site include:

A. Soils

As previously stated, PPL and UGI are installing two caps at the Site as required by the 2006 Settlement Agreement. The caps, when complete, will eliminate any risk associated with on-site soils. Therefore, the RAOs for on-site soils are to:

1) Protect the integrity of the caps and
2) Implement ICs to prevent residential use and any other uses of the Site property which would interfere with or adversely affect the integrity or protectiveness of the caps.

B. Groundwater

Although the beneficial use of the aquifer as a potential drinking water source and restoration to its beneficial use would be an RAO, the presence of DNAPL in the fractures and a limited dissolved plume in the immediate vicinity of the DNAPL precludes the ability to fully restore the affected portion of the aquifer to potable quality. Thus, the RAOs for groundwater are as follows:

1) Prevent human exposures to MGP-related wastes in the groundwater via ingestion, inhalation and dermal contact
2) Prevent further migration of the dissolved phase plume and
3) Implement ICs to prevent groundwater uses which would interfere with or adversely affect the integrity or protectiveness of the final remedy for the Site.

VII. SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA requires that any remedy selected to address contamination at a hazardous waste site must be protective of public health and welfare and the environment, be cost-effective, be in compliance with regulatory and statutory provisions that are applicable or relevant and appropriate requirements (ARARs), and consistent with the NCP to the extent practicable. The Superfund law also expresses a preference for permanent solutions, for treating hazardous substances onsite, and for applying alternative or innovative technologies.

A detailed analysis of the remedial alternatives for soil and groundwater are presented below. These alternatives were developed by PPL and were presented in the FS and the Soil Remedy Engineering Analysis and the Groundwater Report.

A. Soil Alternatives

1. Alternative S-1: No Action

Capital Cost:	$0
Annual O&M Cost:	$0
Present Worth Cost:	$0
Time to implement:	Immediate

The NCP, at 40 C.F.R. § 300.430(e)(6), requires the development of the No Action alternative for remedial actions. The purpose of the No Action alternative is to provide a baseline for comparison against the other alternatives. Under this alternative, no remedial action would be taken to remove, control migration from, minimize exposure to or otherwise reduce the risks associated with Site-related contaminated soils. In addition, no efforts would be made to control the future use of the areas containing contaminated soils. No construction sequence and no capital costs would be incurred, and no ARARs would be considered under this alternative. However, because contaminated soils would remain in place, EPA would conduct five-year reviews as required by Section 121(c) of CERCLA.

2. Alternative S-2: No Further Action and Institutional Controls

Capital Cost:	$ 0
Annual O&M Cost:	$ 13,500
Present Worth Cost:	$167,522
Time to Implement:	weeks to months

This alternative would control risks through the implementation of ICs to maintain the integrity and protectiveness of the remedial actions previously taken at the Site.
Upon PPL and UGI's completion of the work required under the 2006 Settlement Agreement, EPA anticipates requiring no further remediation of on-Site soils. In order to ensure that the integrity and protectiveness of those remedial actions are maintained, EPA proposes to require that PPL and UGI implement ICs at the Site. This alternative would allow for the commercial and/or industrial reuse of the Site. EPA would require PPL and UGI to implement ICs in the form of deed notices, easements and/or restrictive covenants prohibiting current and future Site property owners from using Site property for residential use or in any manner that would interfere with or adversely affect the integrity or protectiveness of the remedial actions performed at the Site.

No capital costs would be incurred, and no ARARs would be considered under this alternative. However, because contaminated soils would remain in place under the caps at the Site, EPA would conduct five-year reviews as required by Section 121(c) of CERCLA.

B. Groundwater Alternatives

1. Alternative GW-1: No Action

Capital Cost:	$0
Annual O&M Cost:	$0
Present Worth Cost:	$0
Time to Implement:	0 years

The NCP, at 40 C.F.R. § 300.430(e)(6), requires the development of the No Action alternative for remedial actions. The purpose of the No Action alternative is to provide a baseline for comparison against the other alternatives. Under this alternative, no remedial action would be taken to remove, control migration from, minimize exposure to or otherwise reduce the risks associated with Site-related contaminated groundwater. The No Action alternative would not meet any of the cleanup objectives described earlier in this Proposed Plan. In addition, this alternative would not provide any controls necessary to protect people and the environment from the Site-related contamination. No capital costs would be incurred and no ARARs would be considered under this alternative. However, because contaminated groundwater would remain in place, EPA would conduct five-year reviews as required by Section 121(c) of CERCLA.

2. Alternative GW-2: Monitored Natural Gradient Flushing and Institutional Controls

Capital Cost:	$ 90,000
Annual O&M Cost:	$ 51,300
Present Worth Cost:	$796,000
Time to Implement:	Several Weeks to a Few Months

This alternative includes utilizing the TI Waiver for groundwater cleanup ARARs in the 7.0-acre area shown on Figure 2 and referred to as the DNAPL Zone. Natural gradient flushing of the dissolved phase plume from the DNAPL Zone into the Susquehanna River would constitute the natural gradient flushing component of this alternative. For this remedy component, the dissolved MGP constituents will continue to be diluted, dispersed, and biodegraded to non-detectable levels in the Susquehanna River, which effectively contains the plume and prevents it from expanding.

EPA is waiving the requirement achieve groundwater ARARs over the designated area of the aquifer, the DNAPL Zone, due to technical impracticability from an engineering perspective. Currently, no technologies are capable of restoring groundwater to health-based standards in the

area of the DNAPL under present Site conditions. A large amount of viscous DNAPL is present in the fractured bedrock. Any technology capable of removing the DNAPL in such an environment, would first have to mobilize the DNAPL and, then, have to extract the mobilized DNAPL. No known technologies are capable of extracting DNAPL from such a complicated fractured bedrock geologic system. Moreover, any attempt to remobilize the DNAPL may cause ecological and human health risks which do not currently exist in the Site vicinity and Susquehanna River.

With respect to the dissolved phase plume immediately adjacent to the DNAPL within the fractured bedrock, technologies used at other sites have been able to reduce the size of the dissolved phase plume. However, at this Site, the dissolved phase plume is in the immediate vicinity of the DNAPL and discharges to the Susquehanna River where it is diluted so that the MGP-related constituents cannot be detected in the water column.

As stated previously, under existing conditions, a small fraction of dissolved phase plume, referred to as the LWA Lobe, will continue to be pulled from the DNAPL area by the LWA cooling water wells. EPA anticipates that LWA will continue to treat that extracted water. However, if LWA were to stop pumping, alternate remedial methods would have to be examined and implemented to cleanup any portion of the LWA Lobe which remains outside of the DNAPL Zone.

The groundwater monitoring and IC components of the remedy would apply to both the DNAPL Zone and the LWA Lobe. Since the dissolved constituents of the DNAPL source area have relatively low solubilities and the natural gradient is to the Susquehanna River, the plume area associated with the DNAPL is relatively small. A monitoring program will be established to confirm that the remedy is consistently performing within expectations and that conditions in the Site area do not change significantly. The existing well network will be enhanced with up to four additional monitoring wells installed in the vicinity of the LWA property, in or near areas of suspected DNAPL contamination, and near discharge locations to the Susquehanna River and Shawnee Creek. Up to 12 wells will be monitored annually for MGP-related constituents.

The IC components of this remedy consist of non-engineering measures including administrative and/or legal controls that help to minimize the potential for human exposure to contaminated groundwater. Currently, local zoning and groundwater development restrictions are in place and are enforced by the Borough. These restrictions prohibit, among other things, the installation of new wells. Additional ICs will be established at the Site to augment the existing protection afforded by the local zoning restrictions. These ICs will include restrictions or notices on Site property deeds regarding the extraction and use of groundwater for any purpose and to allow permanent access to Site wells for monitoring purposes. Other ICs may include enforceable orders, easements and/or restrictive covenants, as appropriate.

Presently, there are no identified human health exposures to groundwater under an industrial use scenario at the Site and there will continue to be no human health risks so risks at

the Site will not change under this alternative.

The primary ARARs for this alternative include the regulations codified at 40 C.F.R. § 141.24, promulgated by EPA pursuant to the Safe Drinking Water Act, and the regulations codified at 25 Pa. Code § 93.8a, promulgated by PADEP pursuant to the Pennsylvania Clean Streams Law.

3. Alternative GW-3: Groundwater Extraction and Treatment

Capital Cost:	$ 2,347,000
Annual O&M Cost:	$ 610,000
Present Worth Cost:	$10,700,000
Time to Implement:	1-2 years

Alternative GW-3 includes the extraction and treatment of the dissolved phase plume to hydraulically control the contaminated groundwater and prevent the migration of the dissolved plume towards the cooling water wells and the Susquehanna River. Groundwater extracted would be treated and discharged to the Susquehanna River. Alternative GW-3 incorporates EPA's intent to invoke a TI waiver because of the presence of the DNAPL contamination. Therefore, as in Alternative GW-2, there would be no further cleanup of the DNAPL and ICs and long-term monitoring will be implemented.

The extraction system required as part of this alternative would include the installation of up to 15 recovery wells to collect contaminated groundwater. A treatment system, discharge pipe, recovery wells, and transmission pipelines are considered as part of this alternative and would also have to be installed and maintained to remove the contaminants of concern to appropriate levels for surface water discharge. The treatment system would include chemical precipitation to remove metals followed by granular activated carbon to remove organic contaminants. The specific treatment system utilized could be modified in the future based on bench-scale testing and the actual treatment system capacity. Operation and maintenance of the system would continue in perpetuity, but its cost is estimated based on a 30-year period in accordance with EPA guidance.

Modeling under natural gradient conditions provided in the TI waiver demonstration indicates that groundwater will be contaminated for at least several centuries and likely for several thousand years due to the presence of the DNAPL. Pumping and treating groundwater from the DNAPL Zone would not likely change the rate of DNAPL dissolution into groundwater appreciably. This result is expected because of the limited contact with DNAPL, low solubility of the DNAPL component, high groundwater velocities and short contact times associated with groundwater extraction activities at the Site would result in the extraction of low contaminant concentrations from the groundwater. This occurrence is known as "tailing effect." Considering this, groundwater extraction activities at the Site are not expected to significantly change the extremely long time required for cleanup of groundwater, nor would they appreciably reduce the

mass of DNAPL within the DNAPL Zone.

The LWA Lobe would be contained as long as the LWA continues to pump wells CWW-1 and CWW-2. If pumping were to discontinue, alternate remedial methods would be examined and implemented to cleanup the LWA Lobe outside the DNAPL Zone (Figure 2). The Susquehanna River prevents the potential for further groundwater plume migration or plume enlargement from the DNAPL to the West.

As with Alternative GW-2, monitoring wells will be sampled and the data analyzed and reported. A total of 40 samples per year have been considered for compliance and monitoring and have been included in the cost estimate. The ICs, as described for Alternative GW-2, would also be included in the alternative.

The primary ARARs for this alternative include the regulations codified at 40 C.F.R. § 141.24, promulgated by EPA pursuant to the Safe Drinking Water Act, and the regulations codified at 25 Pa. Code § 93.8a, promulgated by PADEP pursuant to the Pennsylvania Clean Streams Law.

VIII. EVALUATION OF REMEDIAL ALTERNATIVES

This section provides a description of the nine criteria, as codified in the NCP at 40 C.F.R. § 300.430, EPA uses to evaluate alternatives considered for the Site and EPA's comparative analysis of the alternatives.

A. Evaluation Criteria

The evaluation criteria are as follows:

- Overall Protection of Human Health and the Environment - addresses whether a remedy provides adequate protection and describes how risks are eliminated, reduced, or controlled.

- Compliance with ARARs - addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of environmental statutes.

- Long-Term Effectiveness and Permanence - refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals are achieved.

- Reduction of Toxicity, Mobility, or Volume - is the anticipated performance of the treatment technologies that a remedy might employ.

- o Short-Term Effectiveness - addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

- o Implementability - the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

- o Cost - includes estimated capital and operation and maintenance costs, generally expressed as net present worth.

- o State Acceptance - indicates whether, based on its review of the FS and Proposed Plan, the State concurs with, opposes, or has no comment on the preferred alternative(s).

- o Community Acceptance - will be assessed in the Record of Decision following a review of public comments received on the RI and FS reports and the Proposed Plan.

The last two criteria, State and Community Acceptance, are used in the final evaluation of remedial alternatives, generally after the EPA has reviewed public comments on the Proposed Plan. For this Site, State and Community Acceptance will be evaluated after the public comment period. The "Detailed Analysis of Alternatives" may be found in the FS.

B. Comparative Analysis of Alternatives

The following is a summary of the comparative analysis of the alternatives considered in this Proposed Plan for Site soils:

1. Overall Protection of Human Health and the Environment

A primary requirement of CERCLA is that the selected remedial alternative be protective of human health and the environment. A remedy is protective if it reduces current and potential risks to acceptable levels within the established risk range posed by each exposure pathway at the Site.

Soil:

The No Action alternative would not provide adequate protection of human health and the environment in that it does not prevent human exposure to Site-related contaminants. The No Action Alternative will not be discussed further in the nine criteria analysis because it does not satisfy the threshold criteria of providing overall protection to human health and the

environment.

Alternative S-2 is protective of human health and the environment, since it provides for continued risk reduction through the implementation of ICs. EPA anticipates that the caps required to be installed under the 2006 Settlement Agreement will prevent contact with MGP-related wastes and that the implementation of ICs will maintain the protectiveness and integrity of the caps.

Groundwater:

Alternative GW-1, No Action, would not be protective of human health and the environment, and as such will not be considered further in the nine criteria analysis.

Since no current groundwater risks have been identified at the Site, both groundwater Alternatives GW-2 and GW-3 are protective of human health and the environment. Groundwater from the Site discharges to the Susquehanna River where contamination is not detected at measurable concentrations. A small amount of groundwater is used as cooling water by the LWA. This water is treated and tested to ensure it meets drinking water standards before use.
In addition, future groundwater use in the Site area is prevented by an existing zoning ordinance which prohibits the installation of new wells.

If an unauthorized well is installed in the cooling water well area or if the current groundwater restrictions are repealed, Alternative GW-3, Groundwater Extraction and Treatment, may afford a limited amount of additional protection because it isolates the dissolved phase plume from the cooling water wells, the river, and any potential new unauthorized well, for as long as pumping continues. Moreover, in addition to the existing ordinance prohibiting groundwater use, EPA proposes that ICs be implemented under both alternatives.

The groundwater extraction activities required as part of Alternative GW-3 have the potential to mobilize the DNAPL and cause potential DNAPL migration within the low-permeability bedrock system. In addition, the groundwater extraction system could draw contaminated groundwater and DNAPL outward towards the extraction wells, thereby expanding the extent of contamination in the aquifer.

In addition, during groundwater extraction activities conducted under Alternative GW-3, modeling provided in the Groundwater Report, Appendix A, showed that the Shawnee Creek could be negatively impacted due to induced recharge (leakage) from the Creek to the aquifer and from the loss of recharge from the aquifer to the Creek. The reduction in the Creek water volume may have a negative impact on biological conditions in the creek. Considering this and the potential for this alternative to destabilize the DNAPL present at the Site, Alternative GW-2 is slightly more protective of the environment than Alternative GW-3.

2. Compliance with ARARs

Any cleanup alternative selected by EPA must comply with all applicable or relevant and appropriate federal and state environmental requirements or provide the basis upon which such requirement(s) can be waived.

Applicable requirements are those substantive environmental standards, requirements, criteria, or limitations promulgated under federal or state law that are legally applicable to the Remedial Action to be implemented at the site. *Relevant and appropriate* requirements, while not being directly applicable, address problems or situations sufficiently similar to those encountered at the site that their use is well-suited to the particular circumstance.

EPA will also consult to-be-considered material (TBCs). TBCs are non-promulgated advisories or guidance issued by Federal or State governments that are not legally binding and do not have the status of potential ARARs. However, EPA will consider TBCs along with ARARs and EPA may use the TBCs in determining the necessary level of cleanup for protection of health and the environment.

Soil:

Under Alternative S-2, no further remedial action would be taken and, therefore, no ARARs would be considered.

Groundwater:

EPA's goals for addressing contaminated groundwater are as follows:

> EPA expects to return usable ground waters to their beneficial uses wherever practicable, within a timeframe that is reasonable given the particular circumstances of the Site. When restoration of the ground water to beneficial uses is not practicable, EPA expects to prevent further migration of the plume, prevent exposure to the contaminated ground water, and evaluate further risk reduction. (40 CFR 300.430(a)(1)(iii)(F))

EPA has determined that MCLs are relevant and appropriate standards for remediating the contaminated ground water. However, EPA has determined that the total removal of the DNAPL and the actual restoration of the ground water to MCLs is technically impracticable from an engineering perspective, and is, therefore, waiving the MCLs.

Alternative GW-2 will not change the size or character of the plume. EPA anticipates that the monitoring wells necessary for this alternative will be installed consistent with all ARARs upon the completion of the work currently being performed pursuant to the 2006

Settlement Agreement.

Pumping wells within the DNAPL Zone, as provided in Alternative GW-3, may change the specific size and character of the plume. The plume may change because extraction wells located along the edge of the DNAPL Zone (i.e., in relatively clean areas) may draw contaminated water and potentially mobilize currently stable DNAPL. Therefore, Alternative GW-3 would need to be designed to meet several additional ARARs, including location specific ARARs for treatment, storage, and disposal of potentially hazardous materials and ARARs for minimization of the potential harm, and restoration and preservation of the natural and beneficial values of floodplains. In addition, under Alternative GW-3, Shawnee Creek could be negatively impacted due to induced recharge (leakage) from the creek to the aquifer, and from the loss of recharge from the aquifer to the creek, as shown by modeling provided in Appendix A.

3. Long-Term Effectiveness and Permanence

Soil:

Alternative S-2 achieves this criterion. The caps currently being installed pursuant to the 2006 Settlement Agreement minimize further contaminant migration to the groundwater and prevent potential site worker contact with contaminated subsurface soils. Alternative S-2 would require ICs including deed notices and easements and/or restrictive covenants, as appropriate, combined with the local ordinances to prohibit residential use of the Site and to maintain the protectiveness and the integrity of the caps.

Groundwater:

Neither GW-2 or GW-3 will provide a measurable difference in long-term groundwater conditions in and around the area of the DNAPL at the Site and in the Site vicinity.

Alternative GW-2 will have minimal impacts on existing conditions in the Susquehanna River and Shawnee Creek and will not impact the cooling water wells. The remedy will need to be monitored indefinitely. A small amount of the contaminant mass will be removed by the cooling water wells as long as they remain operational. This mass removal is not expected to change overall Site conditions.

The nature of the DNAPL within a low-permeability fractured bedrock matrix also introduces significant uncertainty with regard to the long-term effectiveness of Alternative GW-3. The installation of the wells within the bedrock may mobilize DNAPL. Further, over the long term, the extraction wells may not be able to sustain a reasonable yield and maintain capture in certain areas. In addition, the heterogeneous nature of the fractured bedrock allows preferential flowpaths to be created. These flowpaths may leave specific areas untreated and cause lateral spreading of DNAPL, thereby reducing the effectiveness of the system considerably.

The extraction system required as part of Alternative GW-3 will need to be operated, maintained and monitored indefinitely. The efficiency of this operation will be greatly reduced by the limited size of the dissolved plume and tailing effects which will reduce the concentration of contamination being treated and increase the quantity of relatively clean water entering the system. The operation of this system will also compete with the LWA cooling water wells for water, and the modeling provided in Groundwater Engineering Analysis Report Appendix A indicates that sufficient water may not be available to meet the LWA's cooling needs. This lack of sufficient supply of water will also reduce the long-term effectiveness of the system installed as part of Alternative GW-3. Considering the potentially severe limitations and minor potential benefits on the long term effectiveness and system performance of Alternative GW-3, it is believed that Alternative GW-2 is a more efficient and effective alternative for the long term permanent management of the Site.

4. Reduction of Toxicity, Mobility or Volume

Soil Alternatives:

The steam and hot water injection; extraction and stabilization activities conducted on the holders as part of the interim remedial activities have reduced the toxicity, mobility and volume of source materials at the Site. Alternative S-2 would not reduce toxicity or volume of the contamination any further, but implementing ICs to protect the integrity and protectiveness of the caps will ensure that the volume of water infiltrating to groundwater continues to be reduced.

Groundwater Alternatives:

Neither Alternative GW-2 nor GW-3 significantly (defined by EPA as greater than a 90%) reduce the toxicity, mobility or volume of contamination in groundwater.

The toxicity of the groundwater contamination will not change under either Alternative GW-2 or Alternative GW-3 since the DNAPL will continue to be present.

There will be no change in the mobility of the contaminants under Alternative GW-2. Under Alternative GW-3 the mobility of the dissolved contaminants in the groundwater will be increased due to pumping. It is possible this pumping may cause DNAPL in fractures to be mobilized into previously DNAPL-free regions. Numerous literature references support this potential DNAPL behavior and the heterogeneous and low permeability nature of the Site aquifer make it especially prone to allowing lateral movement of the DNAPL.

Under Alternatives GW-2 and GW-3 A, small and relatively insignificant amount of the dissolved DNAPL mass/volume will continue to be removed by the cooling water wells (less than 0.02 pounds/day). However, since the source mass/volume is so large relative to the

mass/volume dissolved in groundwater, the mass/volume reduction associated with this is not expected to change Site conditions overall.

Under Alternative GW-3, a small amount of contaminant mass will be removed by the groundwater extraction system. This mass is estimated to be approximately 10 pounds per day initially, and is expected to drop to a much lower level as the more soluble DNAPL components are depleted due to tailing effects. Considering these tailing effects, and the size of the dissolved plume, the source mass/volume of DNAPL removal will be relatively small compared to the size of the DNAPL present.

In summary, neither Alternative GW-2 nor GW-3 will reduce the toxicity of the contaminants at the Site. Alternative GW-2 will not increase the mobility of the contamination present, but Alternative GW-3 may increase both the mobility of the dissolved phase contamination and the DNAPL. Although Alternative GW-3 may remove slightly more contaminant mass than Alternative GW-2, neither alternative will have a significant impact on the amount of contamination present. Given the complexity of removing DNAPL from a low-permeability aquifer, clean-up times are still expected to be several centuries to several thousand years with Alternative GW-3. Considering this information, these two alternatives are believed to be roughly equivalent with regard to this criterion.

5. Short-Term Effectiveness

Soil Alternatives:

Alternative S-2 would be effective in the short-term. Under this alternative, there would be no impacts to on-site workers and the community.

Groundwater Alternatives:

Once all planning and access issues are addressed, both GW-2 and GW-3 could be implemented though conventional means and methods.

Alternative GW-2 involves the installation of monitoring wells. EPA anticipates that PPL and UGI will complete the installation of those wells when it completes the work under the 2006 Settlement Agreement.

Alternative GW-3 requires the installation of a treatment system, discharge pipe, recovery wells, and transmission pipelines. GW-3, therefore, would be much more disruptive to traffic and would create potential noise and odors given the need to install trenching and piping across multiple properties, through Shawnee Creek, beneath roadways, and beneath railroad tracks. Workers would be required to wear specialized protective clothing and to perform air

monitoring to minimize health and odor impacts. Alternative GW-3 would also require a permanent discharge to the Susquehanna River.

Although both alternatives could be completed in an effective manner, Alternative GW-2 would be much easier to install with much less disruption to traffic and local properties. For this reason, alternative GW-2 has considerable advantages with regard to the short-term effectiveness criterion.

6. Implementability

Soil Alternatives:

The ICs required by Alternative S-2 are readily implementable. They will, however, require PPL and UGI to use their best efforts to have Site property owners, including PennDOT, Pennsylvania Lines LLC and the Municipal Authority of Columbia, record deed notices. Such coordination may be difficult and require assistance from EPA and PADEP.

Groundwater Alternatives:

Although Alternative GW-2 and GW-3 could both be implemented, Alternative GW-2 could be implemented more easily.

EPA anticipates that the groundwater monitoring wells necessary for Alternative GW-2 will be installed by PPL and UGI under the 2006 Settlement Agreement. Those wells would also be used under Alternative GW-3; however, Alternative GW-3 would require additional wells along with the installation of a treatment system, discharge pipe, recovery wells, and transmission pipelines. Alternative GW-3 would therefore require additional access agreements from parties such as the LWA, Columbia Borough, PennDOT and Pennsylvania Lines LLC.

For Alternative GW-3, the technology and process options are well established and the equipment is available from multiple suppliers and contractors for installation. Treatability testing and aquifer pumping tests would be necessary to confirm the appropriate system design specifications. Monitoring of the influent, effluent, and wells and operation and maintenance of the system are straightforward. Operation of an extraction well system within the DNAPL area as part of Alternative GW-3 has the potential for mobilizing DNAPL. Implementation of Alternative GW-3 would also require the imposition of water discharge criteria which would need to be established by PADEP.

ICs would be required for both Alternative GW-2 and GW-3. For Alternative GW-2, ICs would be required to provide access to the monitoring wells and to limit well installation which could lead to the potential exposures to groundwater and DNAPL. Alternative GW-3 would require additional ICs to allow permanent access for constructing, operating and maintaining the

groundwater extraction system and for permanent use and access to railroad crossings, crossing state roadways, stream crossings, and other areas of trench installation. These access agreements will need to be coordinated with parties such as the LWA, Columbia Borough, PennDOT and Pennsylvania Lines LLC. Past experience has indicated these types of activities can prolong the project schedule significantly by several years or more, and may also require EPA's involvement.

Based on the above analysis Alternative GW-2 is more easily implementable than GW-3.

7. Costs

An estimated capital, annual operation and maintenance (O&M), and total present worth cost for each of the alternatives has been calculated for comparative purposes, and is presented in Table 8.

For cost estimation purposes, a period of 30 years has been used for O&M. In reality, maintenance of a Site where waste is left in place would be expected to continue beyond thirty years. Similarly, the actual duration of operation for the groundwater extraction and treatment system would depend on its ability to successfully limit off-site migration of Site-related contaminants. The evaluation was based on cost estimates presented in the Focused Feasibility Study, and the Soil and Groundwater Report. The present worth is based on both the capital and O&M costs, and provides the means of comparing the cost of different alternatives.

Table 3 : Summary of Estimated Costs for Soil and Groundwater Alternatives

Alternative Number	Capital Cost	Annual O&M Cost	Present Worth Cost
-Soil Alternatives-			
Alternative S-1	$0	$0	$0
Alternative S-2	$0	$13,500	$167,522
-Groundwater Alternatives-			
Alternative GW-1	$0	$0	$0
Alternative GW-2	$90,000	$51,300	$796,000
Alternative GW-3	$2,347,000	$610,000	$10,070,000

Groundwater

The costs associated with Alternative GW-3 are very high relative compared to the costs associated with Alternative GW-2, and as discussed above, Alternative GW-3 provides no additional risk reduction. Therefore, Alternative GW-2 is strongly favored based on the cost criterion.

8. State Acceptance

The Commonwealth of Pennsylvania will review and comment on this Proposed Plan and all documents supporting this Proposed Plan. The PADEP's comments will be evaluated after the public comment period and will be addressed in the Responsiveness Summary of the ROD.

9. Community Acceptance

The Community Acceptance of the Preferred Alternative will be evaluated based on comments received during the public comment period and will be addressed in the Responsiveness Summary of the ROD.

IX. PREFERRED ALTERNATIVE

After carefully comparing the evaluation criteria for the available alternatives, EPA's preferred alternatives for the Site are the following:

A. Soils

Alternative S-2, No Further Action and Institutional Controls, is EPA's Preferred Alternative. EPA prefers this alternative because it is protective of human health and the environment, provides for the continued safe management of the remaining materials under the caps, includes ICs to control future use of the Site, can be implemented quickly, and has negligible impacts to the surrounding community. Additionally, this alternative allows for the possible future reuse of the Site consistent with the current zoning classification.

B. Groundwater

Alternative GW-2, Monitored Natural Gradient Flushing with Institutional Controls, is EPA's Preferred Alternative. EPA recommends this Alternative for groundwater because it would prevent current and future human exposures via ingestion, inhalation and dermal contact to MGP-related wastes in the groundwater and maintains the natural flushing and migration of the dissolved phase plume to the Susquehanna River. While Alternative GW-3 would hydraulically control groundwater and prevent the migration of the dissolved plume towards the cooling water wells and the Susquehanna River, it could also potentially mobilize the DNAPL.

Therefore, when compared to the Preferred Alternative, the limited benefit of hydraulically controlling the limited contaminated groundwater does not outweigh the noted concerns and significant additional cost of almost $10 million.

As noted previously, a number of Site-related contaminants have impacted the groundwater as DNAPL and as dissolved contaminants. In addition, groundwater studies done during the RI indicate that groundwater from the Site discharges to the Susquehanna River; however, Site-related contamination is not detected in the surface water at measurable concentrations. A small amount of groundwater that is used as cooling water by the LWA is contaminated by the Site and is mixed in with the large volume of river water. The cooling water wells contribute one tenth of one percent of the total water supply. The LWA treats both the source water from the Susquehanna River and the cooling water wells to make it potable. After treatment, this water is tested to confirm it is potable in accordance with PADEP requirements and is distributed through the public water supply system.

As part of the remedy review process, EPA evaluated MCLs for MGP-related wastes in the DNAPL and the dissolved phase plume. EPA judged these requirements to be "relevant and appropriate" standards for remedy selection at the Site. However, conditions at the Site preclude the actual ability to clean the groundwater in the DNAPL Zone to drinking water standards.

EPA has chosen to invoke a TI waiver of the MCL ARARs for 27 contaminants that were found within and above the DNAPL in the DNAPL Zone, pursuant to CERCLA Section 121(d)(4)(C), because aquifer restoration to drinking water quality is technically impracticable using currently available or new and innovative methods or technologies within a reasonable or foreseeable time frame. As long as the DNAPL source zones are not removed or contained, aquifer restoration in and downgradient of the source zone cannot be achieved. DNAPL containment, removal, and treatment methods were evaluated for the Site. Removal and in-situ treatment of DNAPL is technically impracticable because the DNAPL is trapped within the fractured bedrock. The DNAPL has extremely low solubility and high viscosity. Any technology capable of removing the DNAPL would first need to mobilize the DNAPL. No known technologies are capable of doing this under these Site conditions. Moreover, any attempt to mobilize the DNAPL would disturb the DNAPL, thereby increasing potential contaminant migration and potentially creating human health risks, which do not currently exist, at the Site.

With respect to the dissolved phase plume, the dissolved phase plume is in the immediate vicinity of the DNAPL and discharges to the Susquehanna River, where it is diluted below levels which can be detected. The proximity of the Site to the Susquehanna River limits the continued migration of the dissolved phase plume emanating from the DNAPL. While there is a small lobe of the dissolved phase plume migrating toward the LWA and contamination is being pulled into their cooling water wells and ultimately mixed into the LWA water supply (cooling water wells represent 0.1% total volume), the LWA's treatment process is capable of removing the groundwater contaminants prior to distribution to the LWA clients. These current unique Site

circumstances preclude the feasibility of restoring the downgradient dissolved plume to meet drinking water standards. However, if the cooling water wells were ever abandoned, a focused feasibility study should be performed to evaluate how to clean up the groundwater contaminant plume which has been pulled to the these wells through pumping.

As part of EPA's preferred remedy, a regimen of long-term groundwater sampling would be established as part of the Remedial Design. The monitoring would be accomplished to determine whether contaminants of concern are present outside the limits of the DNAPL Zone at concentrations exceeding ARARs and to monitor the LWA Lobe.

In addition, Alternative GW-2 would require ICs restricting the installation and use of groundwater wells and prohibiting any use of the Site that would interfere with the protectiveness or integrity of the Preferred Alternative. The Preferred Alternative will meet all ARARs, other than those being waived, and provide a long-term and permanent solution. The Preferred Alternative offers short-term effectiveness, provided appropriate controls and plans are in-place.

X. COMMUNITY ROLE IN SELECTION PROCESS

This Proposed Plan is being distributed to solicit public comment on the appropriate cleanup action for the Site. EPA relies on public input to ensure that the remedy selected for each Superfund Site considers the needs and concerns of the local community. EPA is providing a 30-day public comment period beginning on June 27, 2007 and ending on July 26, 2007 to encourage public participation in the selection process. EPA will conduct a Public Meeting during the comment period to present the Proposed Plan and supporting information, answer questions, and accept both oral and written comments from the public. Details for the location and time of that Public Meeting is described in the Public Comment section at the beginning of this Proposed Plan.

Background documents regarding the UGI Columbia Superfund Site, as well as copies of the Remedial Investigation and Feasibility Study (RI/FS) Reports, are available to the public at the information repository located at the Columbia Public Library, Columbia, Pennsylvania, and at the EPA Region III offices in Philadelphia, Pennsylvania.

All comments submitted must be postmarked by July 26, 2007.

EPA will summarize and respond to comments received at the public meeting and written comments post-marked by July 26, 2007 in the Responsiveness Summary in the Record of Decision, which will document EPA's selected remedy for the Site. To obtain additional information relating to this Proposed Plan, please contact one of the following EPA representatives:

David Turner
Remedial Project Manager

William Hudson
Community Involvement Coordinator

U.S. EPA - Region III
1650 Arch Street (3HS22)
Philadelphia, PA 19102
Phone: (215) 814-3216
turner.david@epa.gov
(Figure 1)

OR

U.S. EPA - Region III
1650 Arch Street (3HS43)
Philadelphia, PA 19103
Phone: (215) 814-5523
hudson.william@epa.gov

(Figure2)

(Figure 3)

GLOSSARY

Administrative Record - EPA's official compilation of documents, data, reports, and other information that is considered important to the status of, and decisions made, relative to a Superfund site. The record is placed in the information repositories to allow public access to the material.

ARARs - Applicable, or Relevant and Appropriate Requirements. Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA Site.

Relevant and Appropriate requirements are those same standards mentioned above that while not "applicable" at the CERCLA site, address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the particular site.

Baseline Human Health Risk Assessment (HHRA) - A process to characterize the current and potential threats to human health and the environment from contaminant exposures.

BTEX - is an acronym for benzene, toluene, ethylbenzene, and xylene. This group of compounds is found in petroleum hydrocarbons, such as gasoline.

Capping - Construction of a protective cover over areas containing wastes or contamination. Caps prevent surface exposure of the wastes and reduce or eliminate infiltration of rain water or other precipitation into the waste. This minimizes the movement of contaminants from the site through groundwater, surface water or leachate.

Carcinogenic - Cancer-causing agent.

CERCLA - Comprehensive Environmental Response, Compensation and Liability Act (commonly called Superfund), name of the Federal law passed in 1980 and amended in 1986 by the Superfund Amendments and Reauthorization Act codified at 42 U.S.C. §§ 9601 et seq., and again in 2000. CERCLA created a Trust Fund known as Superfund which is available to EPA to investigate and clean up abandoned or uncontrolled hazardous waste sites.

CFR - The Code of Federal Regulations. For example, the citation 40 C.F.R. Part 300 means Title 40 of the Code of Federal Regulations, Part 300.

DNAPL - Dense non-aqueous phase liquid.

Groundwater - Water found beneath the earth s surface that fills pores between soil, sand, and gravel particles to the point of saturation. Groundwater often flows more slowly than surface water. When it occurs in sufficient quantity, groundwater can be used as a water supply.

Hazard Index (HI) - A summation of the hazard quotients for all chemicals and exposure pathways to which an individual is exposed. A hazard index value of 1.0 or less than 1.0 indicates that no adverse human health effects (noncancer) are expected to occur.

Institutional Controls (ICs) - Institutional controls are actions, such as legal controls, that help minimize the potential for human exposure to contamination by ensuring appropriate land or resource use.

Information Repository - A location where documents and data related to the Superfund project are placed by EPA to allow the public access to the material.

MCLS - or Maximum Contaminant Levels are primary drinking water standards promulgated pursuant to Section 1412 of the Safe Drinking Water Act, 42 U.S.C. Section 300g-1, developed by EPA to protect human health. These standards are enforceable and apply to specific contaminants that EPA has determined have an adverse effect on human health.

Manufactured Gas Plant (MGP) - was an industrial facility at which gas was produced from coal and other feedstocks. The gas was stored, and then piped to the surrounding area, where it was used for lighting, cooking, and heating homes and businesses. The gas from the MGP was used for all the same purposes that natural gas is used for today. In addition, in the late 1800s, the gas was used for lighting prior to the introduction of electricity.

National Contingency Plan (NCP) - The Federal regulation at 40 C.F.R. Part 300 that guides the determination and manner in which sites will be cleaned up under the Superfund program.

National Priorities List (NPL) - EPA's list of the nation s top priority hazardous waste sites that are eligible to receive federal money for response action under Superfund.

O& M - Operation and Maintenance

Organic Compounds - Chemicals containing carbon are classified as organic. Many hundreds of thousands are known. Some organic compounds can cause cancer.

PAHs -Polycyclic Aromatic Hydrocarbons, or PAHs, are a group of chemicals that are formed during the incomplete burning of coal, oil, gas, wood, garbage, or other organic substances.

Plume - The three dimensional area of dissolved contamination in groundwater. A plume can expand due to groundwater movement.

ppb - Parts per Billion. Five parts per billion is a fractional representation of 5 parts in 1 billion parts. For solids, ppb is a fraction based on weight, for example 5 pounds of a contaminant in a billion pounds (500,000 tons) of soil. For liquids ppb is based on volume, for example 5 tablespoons of a contaminant in a billion tablespoons (3,906,250 gallons) of water.

ppm - Parts per Million. Five ppm is a fractional representation of 5 parts in 1 million.

Risk Based Concentration (RBC) - EPA Region III's risk based concentration levels for a single contaminant in a single medium, under standard default exposure assumptions. The RBC corresponds to the target risk or hazard quotient.

Record of Decision (ROD) - A legal decision document that describes the remedial actions selected for a Superfund site, why certain remedial actions were chosen as opposed to others, how much they will cost, how the public responded and how the public's comments about the Proposed Plan were incorporated into the final decision.

Remedial Investigation and Feasibility Study (RI/FS) - A report composed of two scientific studies, the RI and the FS. The RI is the study to determine the nature and extent of contaminants present at a Site and the problems caused by their release. The FS is conducted to develop and evaluate options for the cleanup of a Site.

Risk Assessment (RA) - The RA is an essential component of the Remedial Investigation Report. The human health risk assessment (HHRA) evaluates the carcinogenic and non-carcinogenic risks presented by the contaminants at the site. Risk is calculated both for current uses and potential future uses of the property by a defined population (i.e., on and offsite residents, trespassers, etc.). The ecological risk assessment (ERA) is the process which identifies potential risk to aquatic and terrestrial plants and animals from contaminants in soil, surface water, and sediments

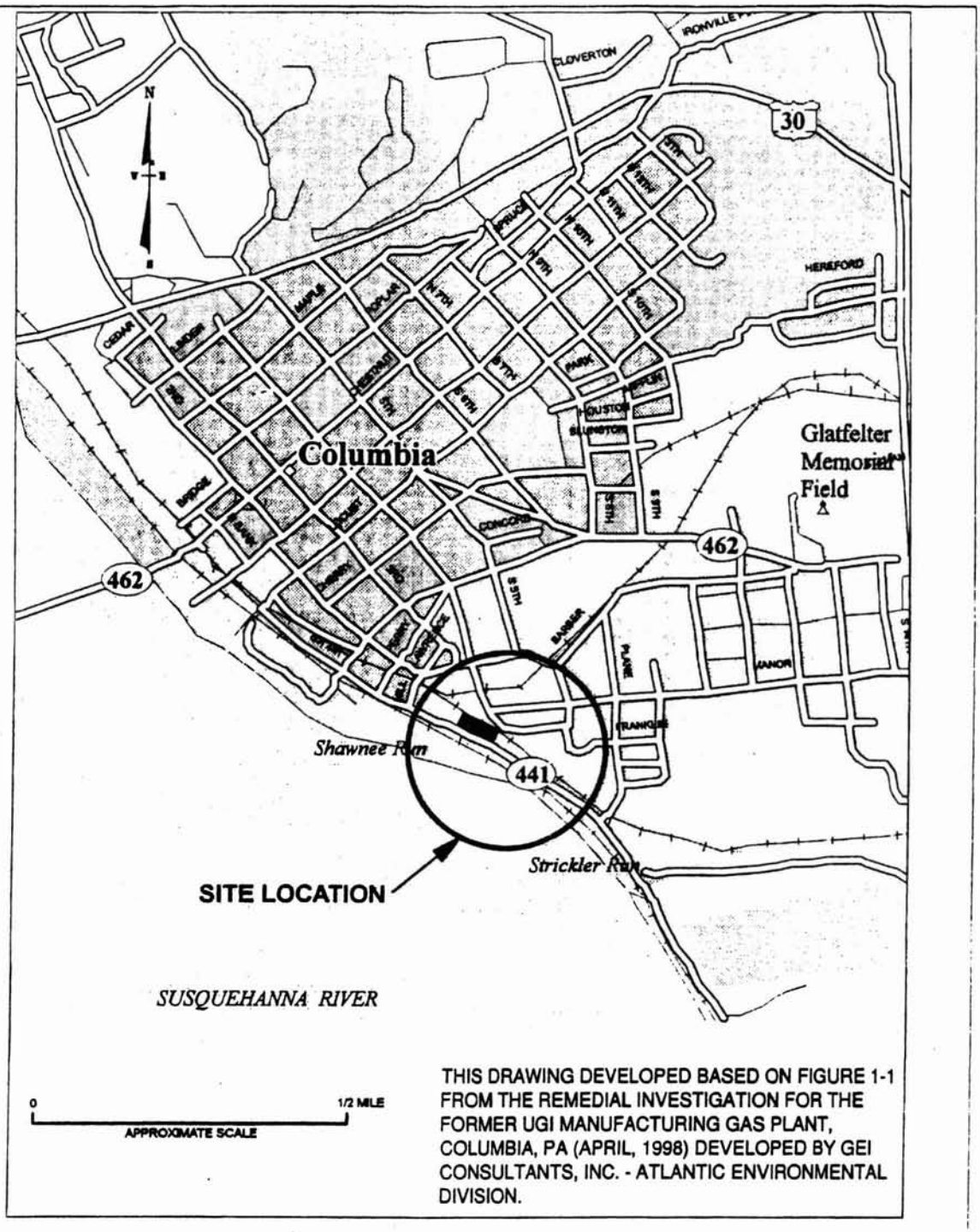
Scientific Notation - In dealing with particularly large or small numbers, scientists and engineers have developed a "short hand" means of expressing these numeric values based on their value in a base 10 system. For example, 1,000,000 can be written as 1E06 and 1/1,000,000 can be written as 1E-06.

Tailing Effect - refers to the progressively slower rate of dissolved contaminant concentration observed with the continued operation of pump and treat systems. At many sites, the asymptotic residual contaminant concentration exceeds cleanup standards.

Target Analyte List (TAL) - a standard list of metals to analyze in samples of various media.

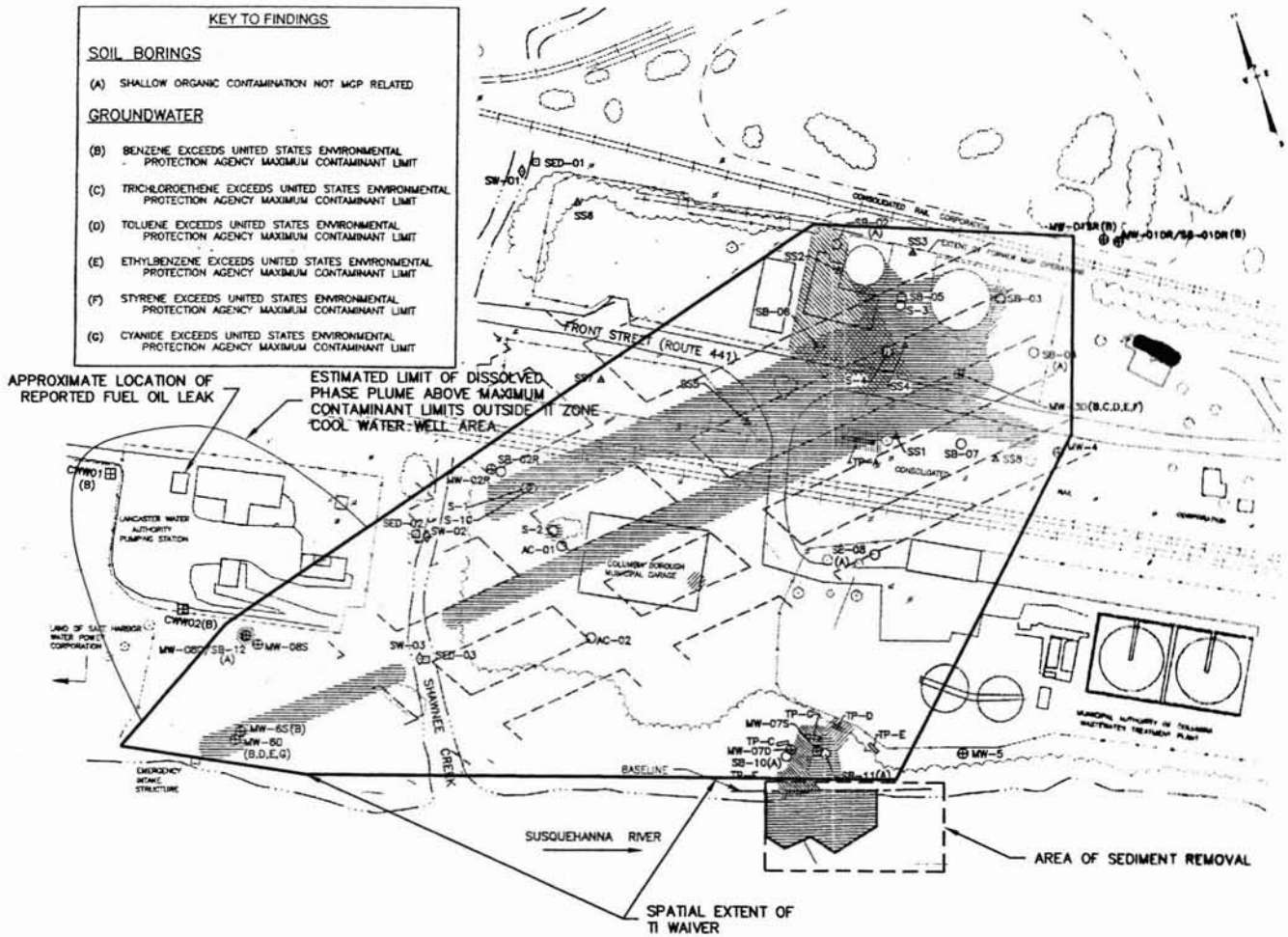
Treatment Storage and Disposal Facility (TSDF) - Facility specifically designed and constructed for the treatment, storage and disposal of RCRA hazardous waste.

Volatile Organic Compounds (VOCs) -Chemical compounds containing carbon that readily volatilize or evaporate when exposed to the air. These compounds are commonly used as solvents.



Scale: AS SHOWN	SITE LOCATION MAP FORMER UGI COLUMBIA MGP SITE
Originated By: GD	
Drawn By: GD	
Checked By: C.T.R.	Advanced GeoServices Corp. Chadds Ford Business Campus, Rts. 202 & 1 Brandywine One, Suite 202 Chadds Ford, Pennsylvania 19317
Proj ect Mgr: C.T.R.	
Dwg No. 97397-28	
Issued:	Project No. 97-397-09 FIGURE: 1

\\COLUMBIA\DRAWINGS\97-397-09\97397-28



THIS DRAWING DEVELOPED BASED ON FIGURE ES-1 FROM THE REMEDIAL INVESTIGATION FOR THE FORMER UGI MANUFACTURING GAS PLANT, COLUMBIA, PA (APRIL, 1998) DEVELOPED BY GEI CONSULTANTS, INC. - ATLANTIC ENVIRONMENTAL DIVISION.

PROPOSED ALTERNATIVE GW-2
TI AREA

PROJECT MANAGER: C.T.R. | SCALE: 1"=120'
CHECKED BY: C.T.R. | PROJECT NUMBER: 97-397-11
DRAWN BY: P.S.G. | DATE: 6/9/06

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FIGURE 2

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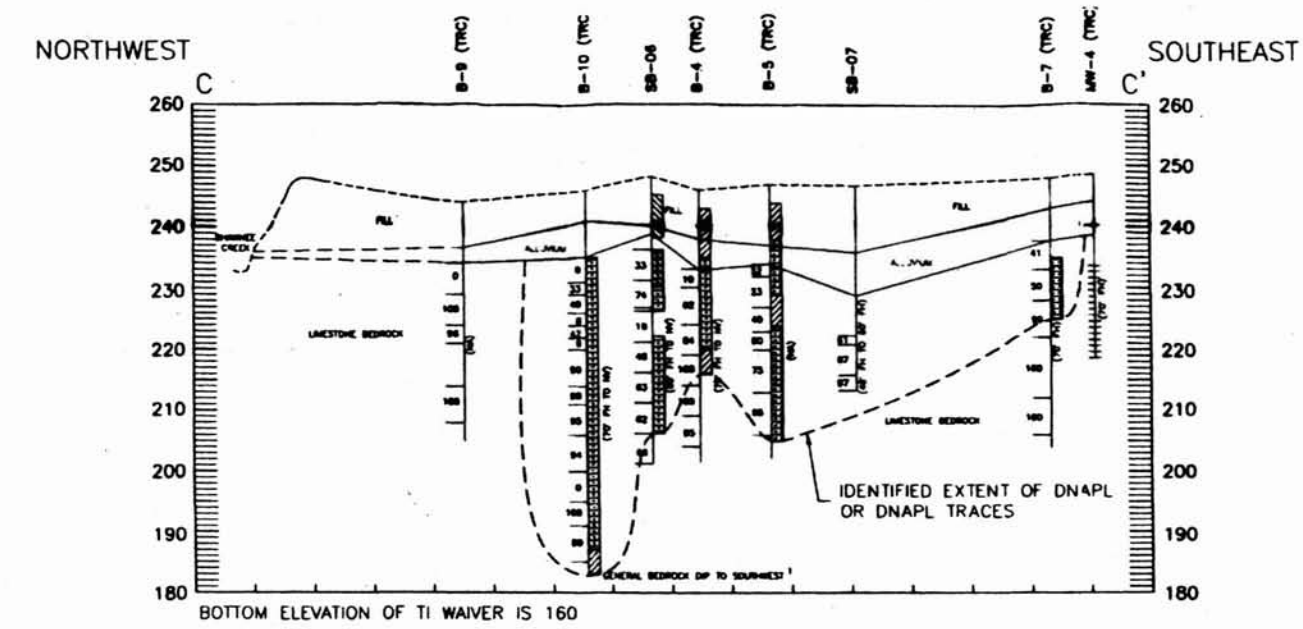
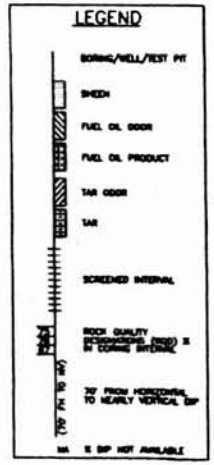
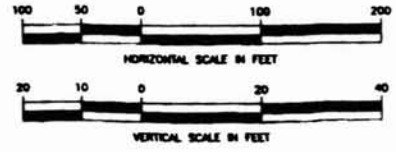




THIS DRAWING DEVELOPED BASED ON FIGURE 4-6 FROM THE REMEDIAL INVESTIGATION FOR THE FORMER UGI MANUFACTURING GAS PLANT, COLUMBIA, PA (APRIL, 1998) DEVELOPED BY GEI CONSULTANTS, INC. - ATLANTIC ENVIRONMENTAL DIVISION.



1. NOTE: FRACTURE AND BEDDING DIPS ARE SHOWN ON FIGURE 2-16

Scale: AS SHOWN	PHYSICAL EVIDENCE OF CONTAMINATION GEOLOGIC SECTION C-C'
Designed By: GEI	
Drawn By: GEI	
Checked By: C.T.R.	Advanced GeoServices Corp. Chadds Ford Business Campus, Rts 202 & 1 Brandywine One, Suite 202 Chadds Ford, Pennsylvania 19317
Project Mgr: C.T.R.	
Dwg No: 97387-14	
Issued:	Project No: 97-387-09 FIGURE: 3